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A chronology of freaque wave encounters

Paul C. Liu

NOAA Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan, USA

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Freak waves is a newly coined term that combines the two common synonymously used terms of rogue and freak waves. Long before the recent sweeping recognition of the existence of freak waves, stories of encounters with the unexpected and unusually large waves in the ocean have been told and proffered among seafarers throughout the ages.

After being ignored or dismissed for decades, freak waves have now emerged as an apropos oceanographic research subject. The current literature consists of various conjectured mechanisms aimed at explaining some aspects for the occurrence of freak waves. Examples are: the linear or nonlinear superposition of waves that lead to larger instability and wave heights, and the focusing of wave energy through time and space, through areas of variable surface ocean currents, and through nonlinear systems such as various attributes of the nonlinear Schrodinger equation. These diversified theoretical postulations mainly demonstrate that it is possible to simulate some wave profiles that might resemble the appearance of freak waves. At the present, however, none of these conjectures can be readily substantiated by measurements or shed new light on how a freak wave can be recognized before its encounter. There is not even an available universal definition for freak waves beyond the simple rule of thumb of a height greater than twice the significant wave height. Contrary to some claims, freak waves are presently not predictable.

The following compilation is an attempt to create a chronology of some of the most-well-known or reliably reported freak wave encounters, along with their respective, relevant, and easily accessible sources. Each case is generally composed of year, date, location, name of the vessel, a brief description of the encounter, and extent of damages if known. While efforts have been made to incorporate all known cases of freak waves that were witnessed, alleged, or adverted to, clearly no premise of accuracy or completeness can be vouched for here. Additions, corrections, and modifications are sincerely welcome. (Send to Paul.C.Liu@noaa.gov) This chronology lists cases through January 2007, future encounters as well as missed cases, if any, can be added to future updates.

1498: While on his third voyage on August 4, 1498, Columbus' fleet of six ships was en-route along the southern tip of Trinidad to the Gulf of Paria when Columbus heard a fearsome roaring from behind his flagship. He turned to see a rogue wave as high as the ship's masts that was approaching too fast for the fleet to escape. It lifted the vessels; hoisting them higher than anything the Admiral had ever experienced and then dropped the fleet into a huge trough. But it didn't stop the ships. Once the wave was behind them, the flotilla escaped the constricted passage to get to the Gulf. Columbus named the passageway »Mouth of the Serpent.« (Source: http://ycaol.com/demons_of_the_deep2.htm)

1545: *Mary Rose*, a four masted warship, was built on the orders of King Henry VIII between 1510 and 1511. She was one of the first ships able to fire broadside, and was a firm favorite of Henry VIII. After a long and successful period of service, she sank on July 19, 1545. It is not clear whether or not a freaque wave caused the capsizing of *Mary Rose*, but reports say there was a breeze that sprang up suddenly, so a freaque wave is one of the possible causes. (Source: <http://www.maryrose.org/lcity/history/history9.htm>)



The Mary Rose as depicted on the Anthony Roll
 © Pepys Library, Magdalene College, Cambridge
 From <http://www.maryrose.org/>

1853: The emigrant ship *Annie Jane*, sailed from Liverpool to Canada with over 500 people on board. On September 28, while off Barra Island, Hebrides, the ship was struck by a huge wave, and 200 people were instantly crushed to death by the collapse of the poop deck. The ship sank soon afterwards, and 102 people were washed safely ashore on a portion of the deck. (Source: http://ycaol.com/demons_of_the_deep2.htm)

1881: October 10, 1881, Firth of Forth, North Sea, the *Alice of Boddam* had left Fisherrow Harbor five days previously, attempting to return to Dunbar

following a spell of bad fishing. While enroute, they encountered a devastating storm. The boat was seen less than a kilometer away from Dunbar Harbor when it was struck by two massive waves, sinking the vessel with all seven crewmembers. (Source: <http://www.eastlothiantoday.co.uk/ViewArticle2.aspx?SectionID=1133&ArticleID=1816121>)

1883: On February 14, 1883 while en-route from Liverpool to Boston, the 98 m steamship *Glamorgan* was hit by an enormous wave that swept the captain and seven men overboard. On February 16, the ship was sighted by the steamship, *Republic*, which rescued 44 survivors before the *Glamorgan* sank. (Source: http://ycaol.com/demons_of_the_deep2.htm)

1884: Steamer *Daniel Steinmann*, an iron ship of 1,785 tons was traveling from Antwerp to Halifax, when it was wrecked at Sambro south of Halifax the night of April 3, 1884. Ninety passengers and 34 of the crew were drowned. Only the captain and several men were saved. According to the captain's statement »... At the same time an immense wave came pouring over her, carrying off every living soul...« and a statement by second boastwain: »... Just at that moment a heavy wave swept over the ship under which it sank...« (Source: http://ycaol.com/demons_of_the_deep2.htm)

1884: The yacht *Nignonette* set sail on May 19, 1884 from Southampton, England, bound for Sydney, Australia on a 19,300 km voyage. Off the coast of West Africa, the vessel was hit by a monstrous storm system. After four terrifying days battling towering waves and hurricane-force gales, a monstrous 12 m »rogue« wave sunk the *Nignonette*. The captain and his three-member crew were cast adrift about 1,600 km from land in a leaky 4 m dinghy. After 19 days adrift, with no food or water, the captain resorted to killing the 17-year-old cabin boy for food to try and save the lives of three left aboard. Five days later, a passing ship rescued them. (Source: http://ycaol.com/demons_of_the_deep2.htm)

1903: October 10, the *RMS Etruria* was only four hours out of New York when at 2:30 pm the ship was struck by a freak wave. The wave was reported to be at least 15 m high, and stuck the ship on the port side. The wave carried away part of the fore bridge and smashed the guardrail stanchions. One passenger was fatally injured, and several other passengers were hurt. (Source: http://en.wikipedia.org/wiki/RMS_Etruria)

1905: Late on the evening of August 27, 1905, the steamer *Peconic* was struggling to make its way southward along the Georgia coast. Bound from Philadelphia to New Orleans with a cargo of 1,500 tons of coal, she was in the midst of a fierce gale that she encountered earlier in the day. Just after midnight on August 28, the officer of the deck gave the order to put further out to sea, as he feared they were approaching perilously close to the beach. As



From http://en.wikipedia.org/wiki/Image:RMS_Etruria_in_colour.jpg

the steamer was in the process of turning to port, an immense wave rolling in from the northeast struck the vessel. The unfortunate timing of the blow caused a shift in the cargo of coal, and the *Peconic* heeled over and almost immediately sank. The sinking was so swift that only 2 of her crew survived; 20 souls went down with the ship. (Source: <http://uwex.us/peconicarticle.htm>)

1909: South Indian Ocean. On July 29 while en route from South African's Durban to Cape Town, the British *SS Waratah* disappeared on her return maiden voyage from Sydney to London. No trace of the ship or any of the 211 passengers and crew were ever found, a freaque wave was always suspected in this case. (Source: [http://en.wikipedia.org/wiki/Waratah_\(ship\)](http://en.wikipedia.org/wiki/Waratah_(ship)))



Picture of *SS Waratah* from Wikipedia: <http://en.wikipedia.org/wiki/Image:Waratah1909.jpg>

1916: Lake Erie. October 29, 1916. Although it was designed for heavy weather, the *Colgate*, a whaleback steamer, couldn't take the waves during the notorious Black Friday, 1916. Three men managed to make it to the liferaft when the ship plunged nose first, but only the skipper would make it ashore. Today the wreck is upside down in 24 m of water in the middle of Lake Erie. (Source: <http://www.lakefury.com/index.php?PHPSESSID=fcbfd03a04c3150daeaf24dc b362eb1d&nPageID=73>)

1929: Lake Michigan. September 9, 1929. The *Andaste* carried a load of gravel from Grand Haven heading southwest toward Chicago but never arrived. Small craft warnings were posted after her departure. The bodies of 14 of the 25 crew members ultimately floated to shore, 11 of them wearing life jackets. (Source: <http://www.macatawa.org/ccrich/andaste.htm>)

1933: A 34 m (112 ft) wave strikes the Navy tanker *Ramapo* in the North Pacific during a storm on February 7. The wave is so tall that it lines up with the ship's crow's nest that led to a fairly accurate estimate of the wave height. (Source: <http://www.leelanau.com/waterfall/soundandfury.html>)

1942: In December 1942. North Atlantic, the *Queen Mary* was hit by a 23 m (75 ft) wall of water while carrying 15,000 American troops from New York harbor to Southampton, England. (Source: http://www.book-of-thoth.com/thebook/index.php/RMS_Queen_Mary)

1943: North Atlantic. Cruise liner *Queen Elizabeth* ploughs into a trough and is hit by two massive waves in succession. The impact shatters the bridge windows 28 m above the waterline. (Source: http://seastead.org/localres/misc-articles/lawton_newsci_06_30_01.html)

1944: Indian Ocean. British Royal Navy cruiser *Birmingham* plunges into a deep hole then takes a huge wave over her bow. The commander reports wading through knee-high water on the deck, which is more than 18 m above sea level. (Source: http://seastead.org/localres/misc-articles/lawton_newsci_06_30_01.html)

1951: North Atlantic. In December 1951 the *SS Flying Enterprise*, a 6,711 ton ship, en route from England to the United States, encountered a severe North Atlantic storm, suffered hull cracks, and took on a heavy list to port. For nearly two weeks thereafter, *Flying Enterprise's* Master, Captain Henrik Kurt Carlsen, remained aboard his ship as efforts were made to tow her to port. He was finally forced to abandon her when the list increased to a fatal degree on January 10, 1952, only about 64 km away from Falmouth, England. The ordeal of the *Flying Enterprise* and Captain Carlsen was world wide news at the time and remains one of the great stories of endurance and courage at sea.

(Source: http://en.wikipedia.org/wiki/Flying_Enterprise and <http://www.teesships.freeuk.com/1129flying2.htm>)

1966: North Atlantic. Italian steamship *Michelangelo* is hit by a 21-meter wave en route to New York. The water smashes through the bridge and into the first class compartments, killing two passengers and a crew member. (Source: <http://www.fettes.com/shetland/wave%20environment.htm>)

1968: On June 13, 1968 the tanker *World Glory*, carrying 49,000 tons of crude oil, encountered an abnormally large wave 105 km east of Durban, South Africa. The ship was broken in half, and both halves sunk within four hours. (Source: <http://www.dynagen.co.za/eugene/freaks.html>)

1973: A reported rogue wave off the coast of Durban, South Africa strikes the 12,000-ton cargo ship *Bencrauchan*. The ship is towed into port, barely floating. (Source: <http://brucestutz.com/articles/rogue3.htm>)

1973: The cargo vessel *Neptune Sapphire* on her maiden voyage, carrying about 15,000 tons of cargo. The impact of a single, large wave off the southeastern shore of Africa caused the bow and 61 meters of the forward part of the ship to break away and sink. The remainder of the ship was towed to East London. According to Capt. DAI DAVIES, Smit Marine, South Africa, this big wave just came out of nowhere, hit the bow, and destroyed the whole bow. (Source: <http://www.oceansatlas.com/unatlas/issues/emergencies/OceanPhenHDNO/Dangerous.html>)

1974: In May, 1974, Norwegian tanker *Wilstar* is famed to have been hit by a freak wave off east coast of South Africa's Natal Province in the Agulhas



From http://en.wikipedia.org/wiki/Image:RMS_Etruria_in_colour.jpg

current. There are not many details known about this case, but the frequently shown picture of its bow damage presumably resulted from the combined forces of pitch motion and a steep incoming wave. (Source: http://www.esa.int/esaCP/SEMOKQL26WD_index_1.html and <http://www.geocities.com/Heartland/Ridge/2216/text/MARITIME.TXT>)

1975: On November 10, 1975 the *SS Edmund Fitzgerald* sank in Lake Superior. A freak wave was suspected. All 29 crew members were lost. (Source: <http://cimss.ssec.wisc.edu/wxwise/fitz.html> and <http://nightbirdsountain.blogspot.com/2005/11/legend-lives-on-june-7-1958-edmund.html>)

1976: The oil tanker *Cretan Star* in the Indian Ocean off Bombay radios for help: »Vessel was struck by a huge wave that went over the deck.« The ship is never heard from again. The only sign of the vessel's fate was a 6 km oil slick. (Source: http://ycaol.com/demons_of_the_deep2.htm)

1977: On October 20, 1977, the chemical tanker *Stolt Surf* encountered hurricane like storm and huge waves while voyaging across the Pacific from Singapore to Portland, Oregon. Photographer Karsten Peterson of Demark was on board, taking pictures and provided an eyewitness account: »when the big waves came crashing towards us, we had to look *UP* in order to see the top of the waves! And that was from the bridge deck, which is already 22 meters above sea level!« So the wave can be conceivably around 30 m high. (Source: http://www.geocities.com/kp_diver/index111TheStorm.html)



Picture by Karsten Peterson. (See http://www.geocities.com/kp_diver/index.htm)

1978: On 7 December, 1978, the German merchant navy super-tanker *München*, en route to America, disappeared. All that was found of the *München* and her 26 crewmembers was a lifeboat that had suffered an incredible battering. She

was one of the biggest ships ever built – the length of two-and-a-half football pitches – and unsinkable, as it was claimed. (Source: <http://www.oceanpix.co.uk/Special-articles/Freak-waves-and-wave-simulation.htm>)

1980: A huge wave was reported to have slammed into the oil tanker *Esso Languedoc* off the east coast of Durban, South Africa. (Source: http://www.abc.net.au/science/news/space/SpaceRepublish_1161681.htm)



Picture by Philippe Lijour. (See http://www.math.uio.no/~karstent/waves/index_en.html)

1980: On or about September 9, 1980, The *MV Derbyshire* sank off the coast of Japan at apparently 25° 30' North, 130° 30' East. There were 44 people on board, including 2 wives; there were no survivors. The ship had been hovering to in Typhoon Orchid (Typhoon 15, 16). There were no Mayday calls. Freaque waves were suspected. She was en route to Kawasaki, Japan with a cargo of Iron Ore Concentrates (Caroline Concentrates) loaded at Sept Isles, Canada. (Source: <http://www.wemt.nl/RINA%20paper.pdf>)

1982: Not only ships, but offshore platforms may encounter freaque waves also. On February 15, 1982, a giant wave smashed through the ballast control room window of the oil drilling platform *Ocean Ranger* off the coast of Newfoundland, short circuiting the electrical system, making it impossible to warn the crew. The rough seas caused the platform to sink, and all 84 onboard were lost with no survivors. (Source: http://en.wikipedia.org/wiki/Ocean_Ranger and <http://www.chs.k12.nf.ca/socstud/ssgrassroots/oceanranger/OceanRangerLesson.htm>)



From <http://www.chs.k12.nf.ca/socstud/ssgrassroots/oceanranger/OceanRangerIntro.htm>

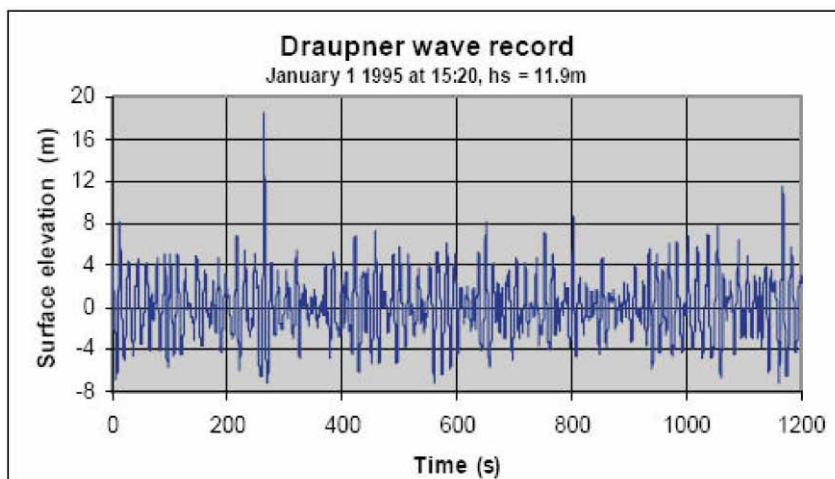
1984: North Atlantic. On June 3, 1984 the three-masted brig *Marques* encountered a freak wave 120 km north of Bermuda and was lost in 45 seconds. Of the 28 onboard, there were only 9 survivors. (Source: <http://www.science-frontiers.com/sf066/sf066g14.htm> and <http://seafarer.netfirms.com/2/marques.htm>)

1985: On April 27, 1985 the tanker *Taganrogsky Zaliv*, of former Soviet Union, encountered a freak wave, and a seaman was killed and washed overboard. According to the description by the ship's crew, the unusual wave looked like a deep hole in the sea, that appeared so suddenly in front of the ship that it was practically impossible to take any precautionary measures to avoid sliding down into the deep wave trough. (Source: <http://www.icms.org.uk/meetings/2005/roguewaves/presentations/Lavrenov.pdf>)

1991: On November 4, 1991 a major storm, originally referred to as the »Halloween Nor'Easter« which was later recoinced the »Perfect Storm« by a meteorologist, and made famous by Sebastian Junger's book and a Hollywood production, harassed boats from Nova Scotia down to the New Jersey coast. The 70' longliner *Andrea Gail* went down in that storm and with her went the crew of six swordfishermen. (Source: <http://www.andreagail.50megs.com/> and <http://www.ecnnews.com/storm/>)

1995: On New Years day, January 1, 1995, a down looking laser-based wave sensor at the *Draupner* platform in the North Sea, owned by Statoil, recorded a wave with a majestic crest height that is widely considered to be the portrait

of a freaque wave. That wave, often referred to as the *Draupner* wave had a 26 meter maximum height over a 12 meter significant wave height wave field. It is clearly an outlier and is treated as a standard freaque wave event among academic scientists. (Source: http://www.ifremer.fr/web-com/stw2004/rw/fullpapers/walk_on_haver.pdf)



From Haver 2004 http://www.ifremer.fr/web-com/stw2004/rw/fullpapers/walk_on_haver.pdf

1995: In September, the cruise liner *Queen Elizabeth II* encountered a 29-meter rogue wave in the North Atlantic that Captain Ronald Warwick described as »a great wall of water – it looked as if we were going into the White Cliffs of Dover.« (Source: http://www.vos.noaa.gov/MWL/dec_04/rogue.shtml)

1998: North Atlantic. The *Schiehallion*, a BP Amoco floating production platform, is struck by a wave that smashed 18 meters above the waterline on November 9, 1998. (Source: <http://w3g.gkss.de/projects/maxwave/workp/wp4.pdf>)

2000: September 28, 2000. The P & O luxury liner *Oriana* was hit by a 12 m wave that smashed through six cabins as she sailed to Southampton from New York. The *Oriana* was about 1000 km west of Ireland in rough seas when the wave hit. Windows in six cabins were damaged; three passengers suffered minor injuries from broken glass. (Sources: <http://www.maritimematters.com/shipnews2000.html>, <http://www.cruisecritic.com/news/news.cfm?ID=19>)

2001: In the week between February and March, two tourist cruisers, the *Bremen* and the *Caledonian Star*, had their bridge windows smashed by 30 m

freak waves in the South Atlantic. (Source: <http://www.oceanpix.co.uk/Special-articles/Freak-waves-and-wave-simulation.htm>)

2001: On September 5, 2001 the bulk carrier *Ikan Tanda*, ran aground off Scarborough on the southern Cape Peninsula's Atlantic coast, at the mercy of what has been described as the worst storm in 50 years. The same storm blew a fishing vessel onto the breakwater in Table Bay. (Source: <http://web.uct.ac.za/depts/shiplaw/capstorm.htm>)

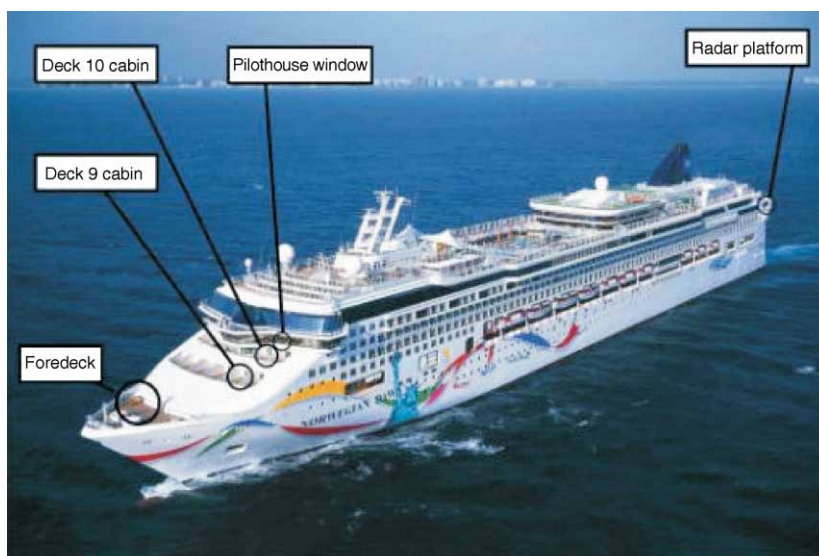
2002: December 15, 2002, *MS Hanseatic* of the Radisson Seven Seas was struck by a large rogue wave while on a coastal cruise of New Zealand. It broke out one of the bridge windows and damaged electrical systems, there were no major injuries reported. (Sources: http://liners.greatnet.us/ol_news-2002.htm, <http://www.cruisejunkie.com/events2002.html>)

2005: *MV EXPLORER* (ex *OLYMPIC EXPLORER*, *OLYMPIA EXPLORER*) was struck by a 15 m wave while sailing 1,050 km south of the Aleutian Islands and about 2,600 km from Honolulu. The wave smashed through the bridge windows of the 180 m ship around 2:30 pm January 26. The salt water poured over electrical instruments and disabled all four engines. One engine was brought back online about an hour later and still later, a second, giving about 10 knots. (Source: <http://www.maritimematters.com/shipnews2005a.html>)

2005: Mediterranean, February 14, 2005, The cruise ship *Grand Voyager* encountered Force 11 gales and ferocious waves up to 15 m high, knocked out electric power, stopped the engine, and the ship was left helplessly adrift. While a huge wave was indicated, it was not necessarily a freak wave. Cavaleri and Bertotti (WISE 2007, <http://www.swin.edu.au/hosting/wise/WISEagenda2.doc>) made a thorough hindcast of wave conditions for this case using various available wind and wave models and reported waves that day were no more than 9 m high. So it appears visual estimations by those who actually encountered the waves may tend to overestimate the actual height. On the other hand if it were a freak wave per se, then the unpredictability of freak waves would not necessarily negate the hindcast – only add further uncertainties. (Source: <http://cruise-chat.com/eve/forums/a/tpc/f/533601132/m/339107609/inc/-1>)

2005: April 2, 2005, the commercial fishing boat *Tracie Lynn* was hit by a rogue wave approximately 9 m tall during a heavy storm off the shore of North Carolina. Two of the crew members were recovered. Johnny W. Brown, a 38 year old fisherman out of Murrells Inlet was never seen again. (Source: <http://www.murrellsinletsc.com/community.html>)

2005: North Atlantic, April 16, 2005, A »freak wave« estimated more than 21 m high slammed a luxury cruise ship steaming for New York. The *Norwegian*



Circled areas were those damaged by the freak wave hit.
 From <http://www.nts.gov/publicatn/2005/MAB0503.htm>

Dawn, an opulent ocean liner almost 300 m long, limped into Charleston, S.C. after it hit vicious seas in an overnight storm off Florida – then was creamed by the rogue wave after dawn. What's really relevant here is the comment by the Norwegian Cruise Line spokesperson: »The sea had actually calmed down when the wave seemed to come out of thin air at daybreak. Our captain, who has 20 years on the job, said he had never seen anything like it.« (Source: <http://www.nydailynews.com/front/story/300826p-257523c.html>)

2006: May 14, 2006, the 15 m Trawler *Kotuku* sank in Foveaux Strait, between Bluff & Stewart Island, NZ with a loss of six lives. Four of them were from the same family and covered three generations. There were three survivors. It was reported that two big waves struck so suddenly and violently that no one caught in the Foveaux Strait trawler tragedy had a chance to react. (Source: http://subs.nzherald.co.nz/location/story.cfm?l_id=500603&ObjectID=10382024)

2006: May 22, 2006, Brittany Ferries was forced to divert its flagship vessel, *mv Pont-Aven*, to a port in northern France after it was hit by a freak wave that smashed a cabin window and flooded several cabins. The 41,000-tonne *Pont-Aven*, with 1,149 passengers onboard, was sailing from Plymouth to the Spanish port of Santander through a force nine gale when it was hit by a wave thought to be 12 m high. (Source: <http://www.timesonline.co.uk/article/0,,13509-2191940,00.html>)

2006: On November 11, the 42,000-tonne oil tanker *FR8 Venture* was hit by huge waves while passing through the Pentland Firth, one of the world's most notorious stretches of water. Two crewmen who were standing on the deck were killed and another seriously injured as the ship was caught in a gale force eight storm and buffeted by waves over 6 m high. »The ship may have got hit by a freak wave.« said the coastguard. (Source: http://observer.guardian.co.uk/uk_news/story/0,,1945869,00.html)

2006: On November 17, a rogue wave sank a 11 m commercial fishing boat off the coast of Florida nearly killing the captain and another crew member. They were rescued after over 30 hours at sea. (Source: <http://www.wftv.com/news/10499662/detail.html>)

2006: On December 8, the Barque *Picton Castle* encountered gale force conditions while on passage from her homeport of Lunenburg, Nova Scotia, to the West Indies. At approximately 2200 hours, the ship's decks were overwhelmed by an unusually large wave, and crew member Laura Gainey of Montreal, Canada, was swept overboard. The ship immediately stopped, deployed life saving gear, and employed all of its extensive emergency and communications equipment in the call for assistance. Search and rescue efforts began immediately. Assisted by fixed wing aircraft from the Canadian and United States Coast Guard, as well as two merchant vessels, the captain and crew of the *Picton Castle* scoured the Atlantic for four days without respite in hopes of finding their shipmate. Their search was suspended December 12. (Source: <http://www.picton-castle.com/>)

2006: On December 16, a commercial fishing vessel, *F/V Ash*, sank after being hit by two sneaker waves in a treacherous bar near the Rogue River. Aboard the *Ash*, a 13 m fiberglass boat, were owner and Capt. Rob Ashdown, 44, of Port Orford and three crewmen: Mark Wagner, 40, Joshua Northcutt, 30, also of Port Orford; and Louis Lobo, 39, of Las Vegas. The crew was fishing for crab in the wake of a powerful storm that left the river running high, and a buoy 27 km offshore of Port Orford reported waves of between 4 and 5 m that afternoon. According to the manager of the Port of Gold Beach »It was a heavy surf, running 6 to 8 m or better. They lined up about the end of the jetty. The waves caught them. Stood them up pretty steep. The first one caught the boat. It started going up and came down. The next one caught it behind and rolled it.« (Source: http://www.currypilot.com/news/results.cfm?story_no=14166)

2007: On January 25, the 18 m fishing boat *Starrigavan*, while trying to cross the bar of Tillamook Bay along the Oregon coast about 9:30 pm, was hit by three 6 m waves and rolled three times, one of four crew members was killed, and the vessel was thrown onto a jetty. (Source: <http://www.theworldlink.com/articles/2007/01/26/news/news12.txt>)

2007: On February 1, the cruise ship Prinsendam encountered two rogue waves near Cape Horn about 12 m high after the ship ran into hurricane force winds earlier according to the online journal of a passenger onboard. (<http://journals.aol.com/jmarsh5752/jills-trip-to-south-america/>) There were around 40 injuries, though none serious but some needed hospitalization. This case was independently confirmed by another passenger in a You Tube report. (<http://www.youtube.com/watch?v=MnoTj7Jx4L4>)

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Author’s address: Paul C. Liu, NOAA Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan 48105, USA, e-mail: Paul.C.Liu@noaa.gov